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Radmore et al.

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[54] **PENDULUM ROLL LOADER**

[75] Inventors: **Robert R. Radmore**, Olcott; **John T. Hall**, Williamsville, both of N.Y.

[73] Assignee: **Carborundum Abrasives Company**, Niagara Falls, N.Y.

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[22] Filed: **May 1, 1984**

[51] **Int. Cl.**^{3} **B65H 19/30**

[52] **U.S. Cl.** **242/58.6**

[58] **Field of Search** 242/58.6, 79, 58.2, 242/58.3, 64; 414/589, 590, 592, 911, 113

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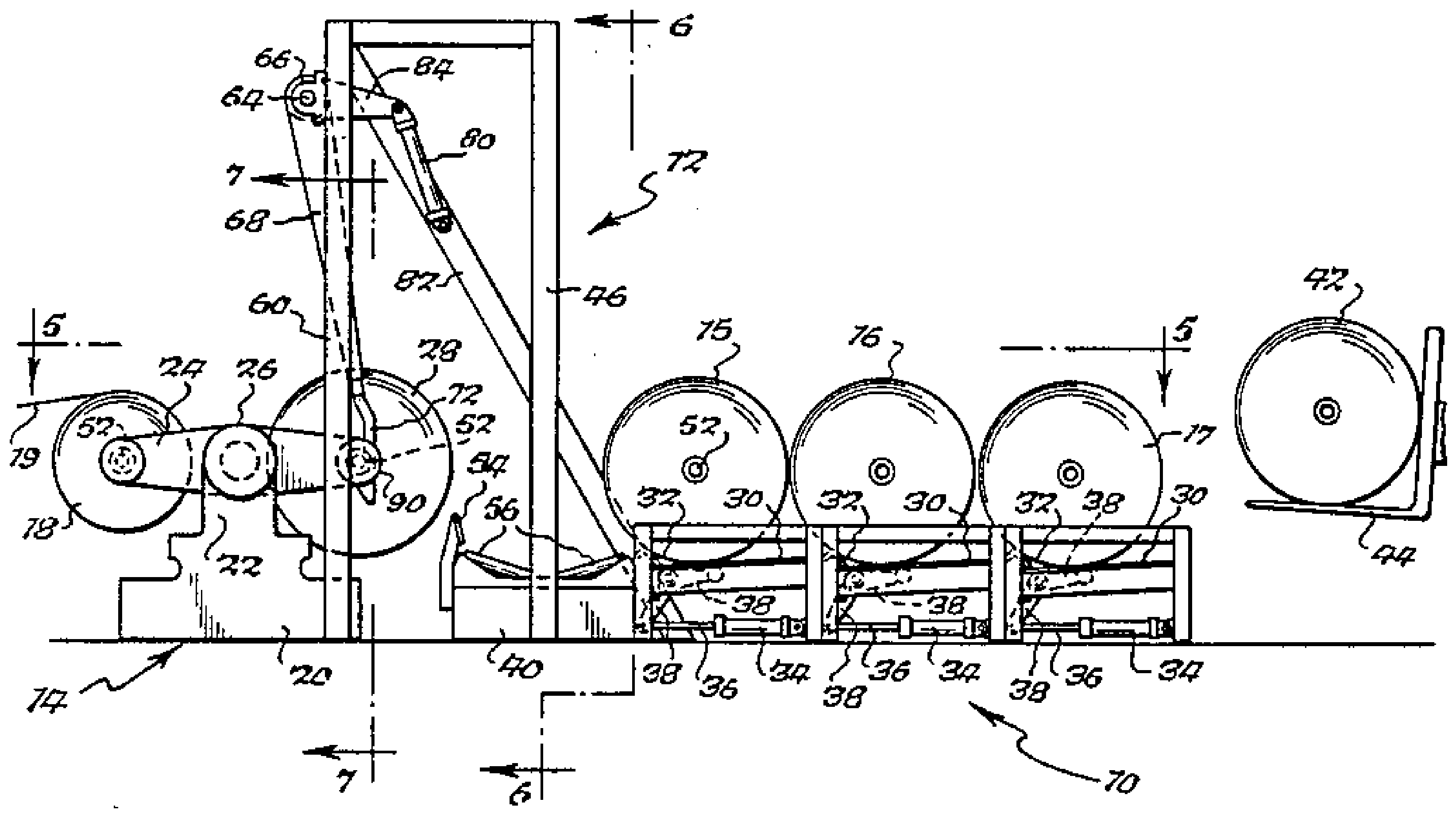
Primary Examiner—Stephen Marcus
Assistant Examiner—Leo J. Peters
Attorney, Agent, or Firm—Michael L. Dunn; William H. Holt

[57] **ABSTRACT**

Apparatus for sequentially presenting a series of rolls of cloth or paper, etc. to an unwind device, the rolls being precisely positioned for automatically being grasped by chuck members on the unwinder. Storage and transfer means are provided for assuring a constant supply of rolls being presented.

4 Claims, 7 Drawing Figures



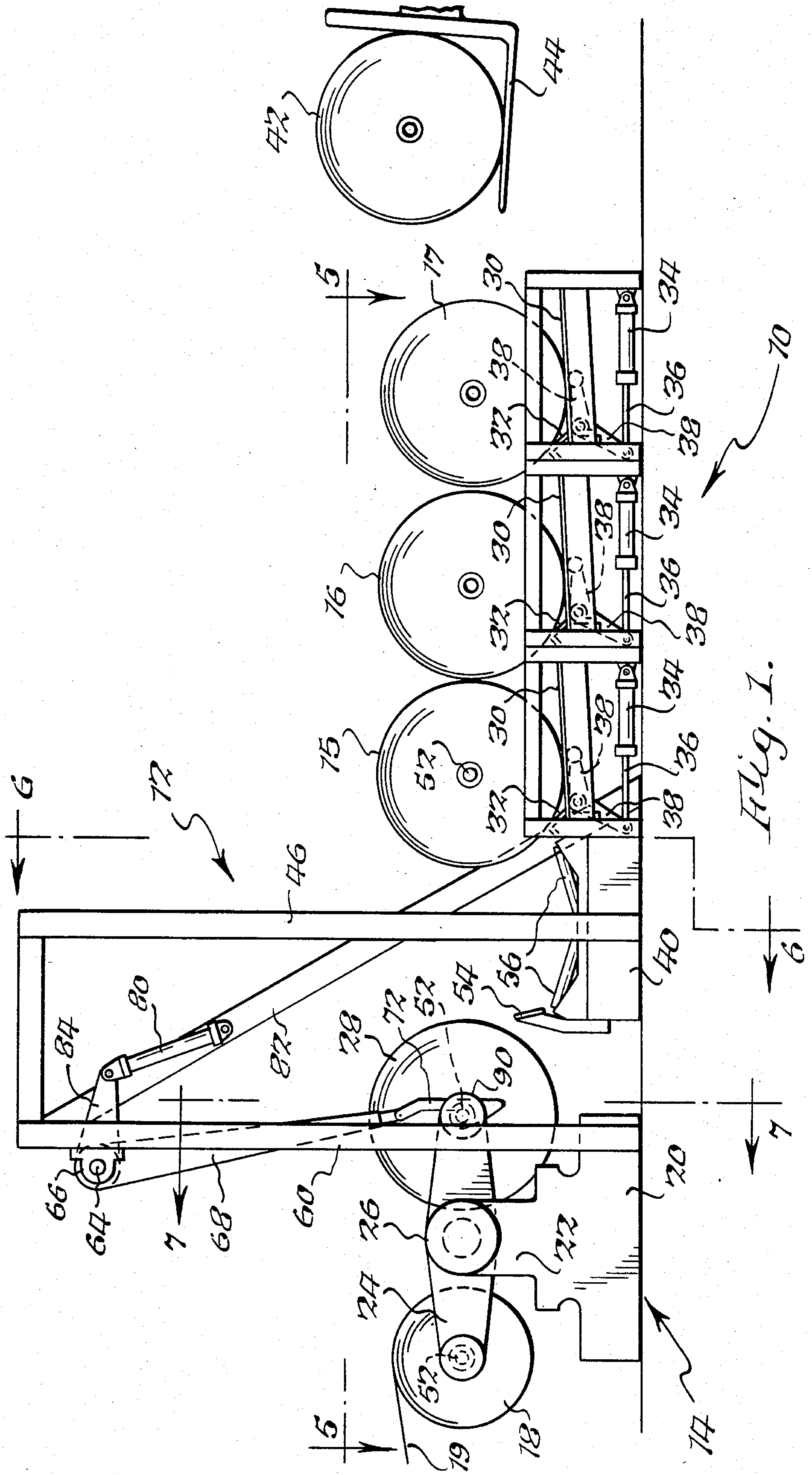

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Fig. 1.

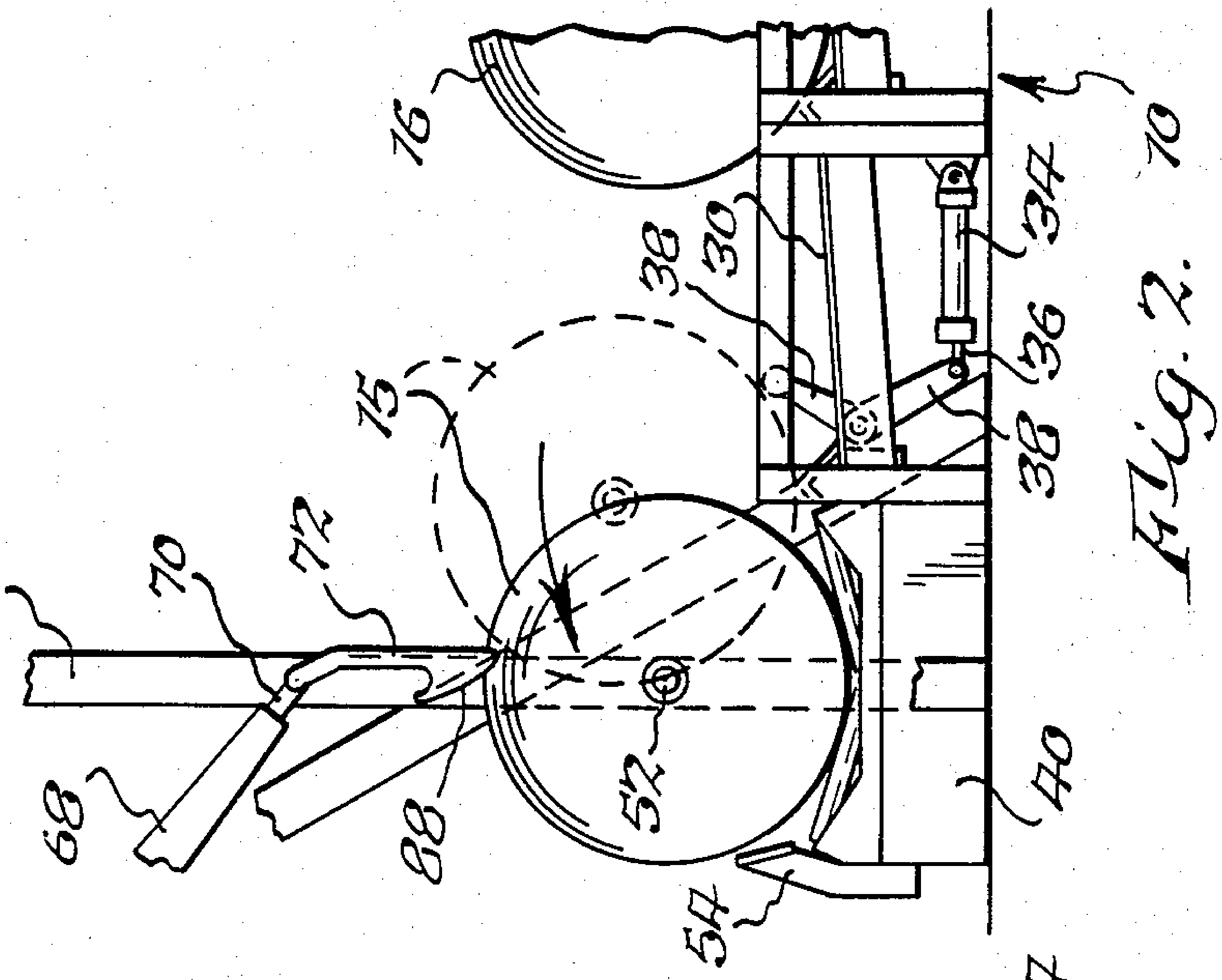

Fig. 2.

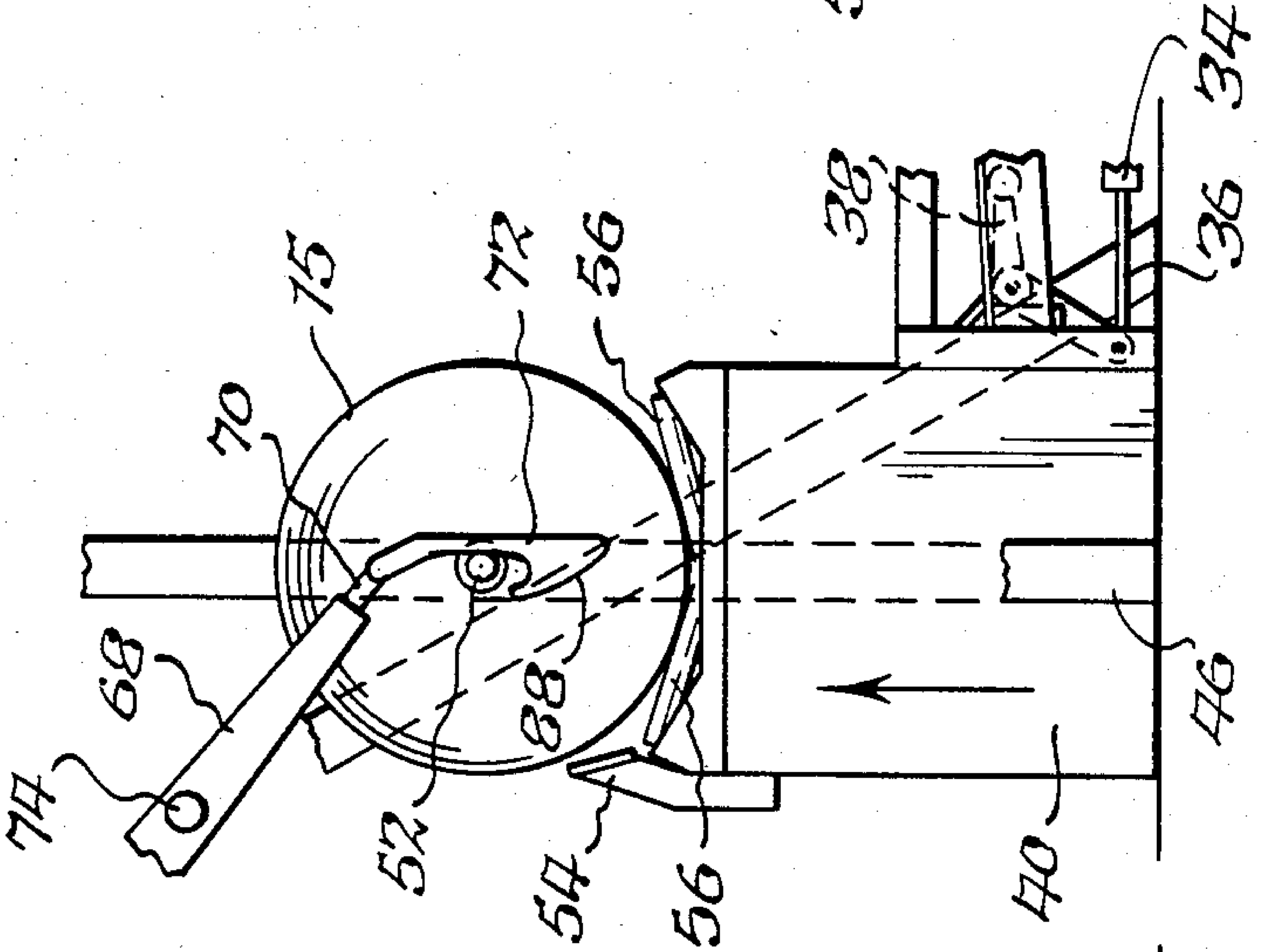

Fig. 3.

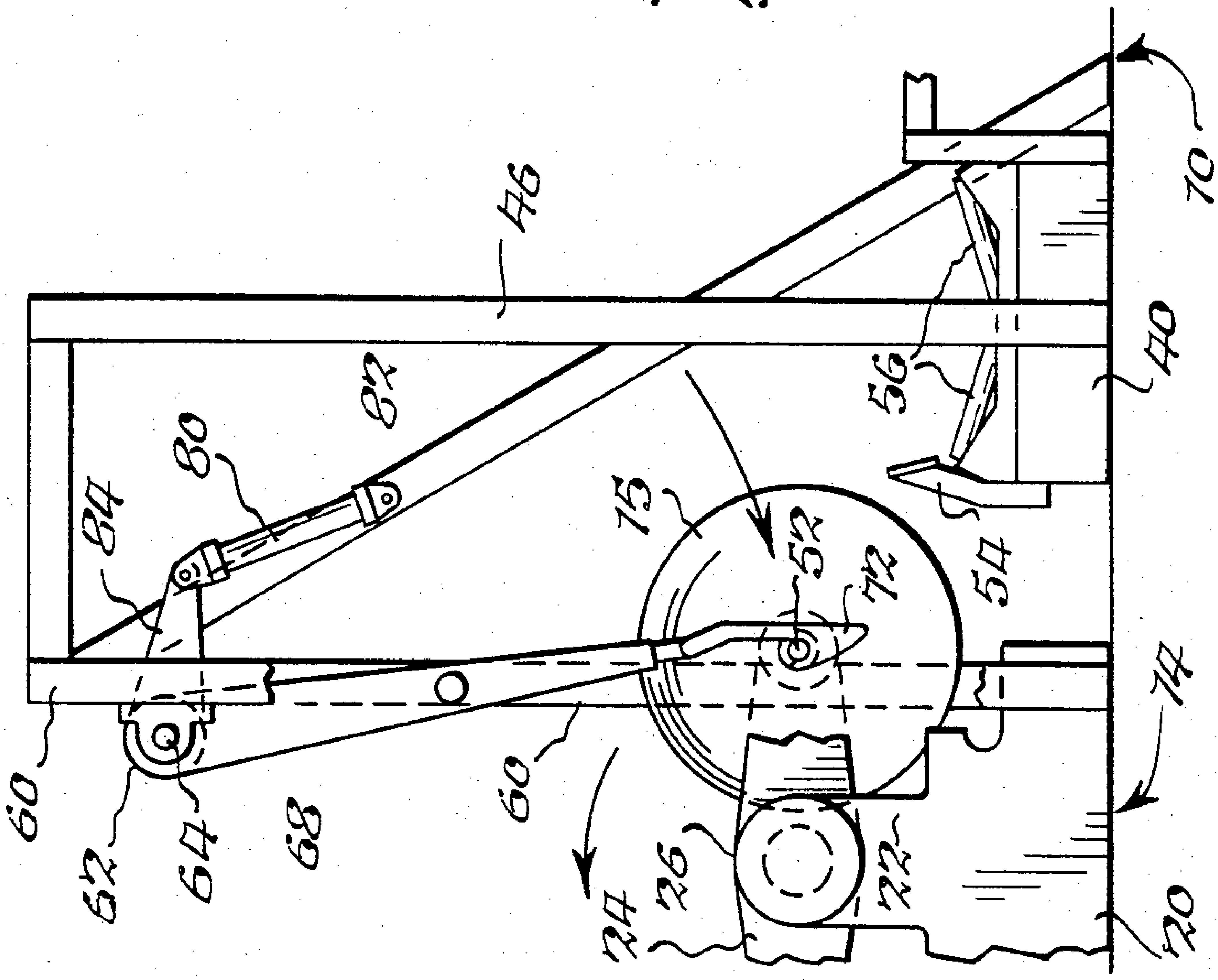

Fig. 4.

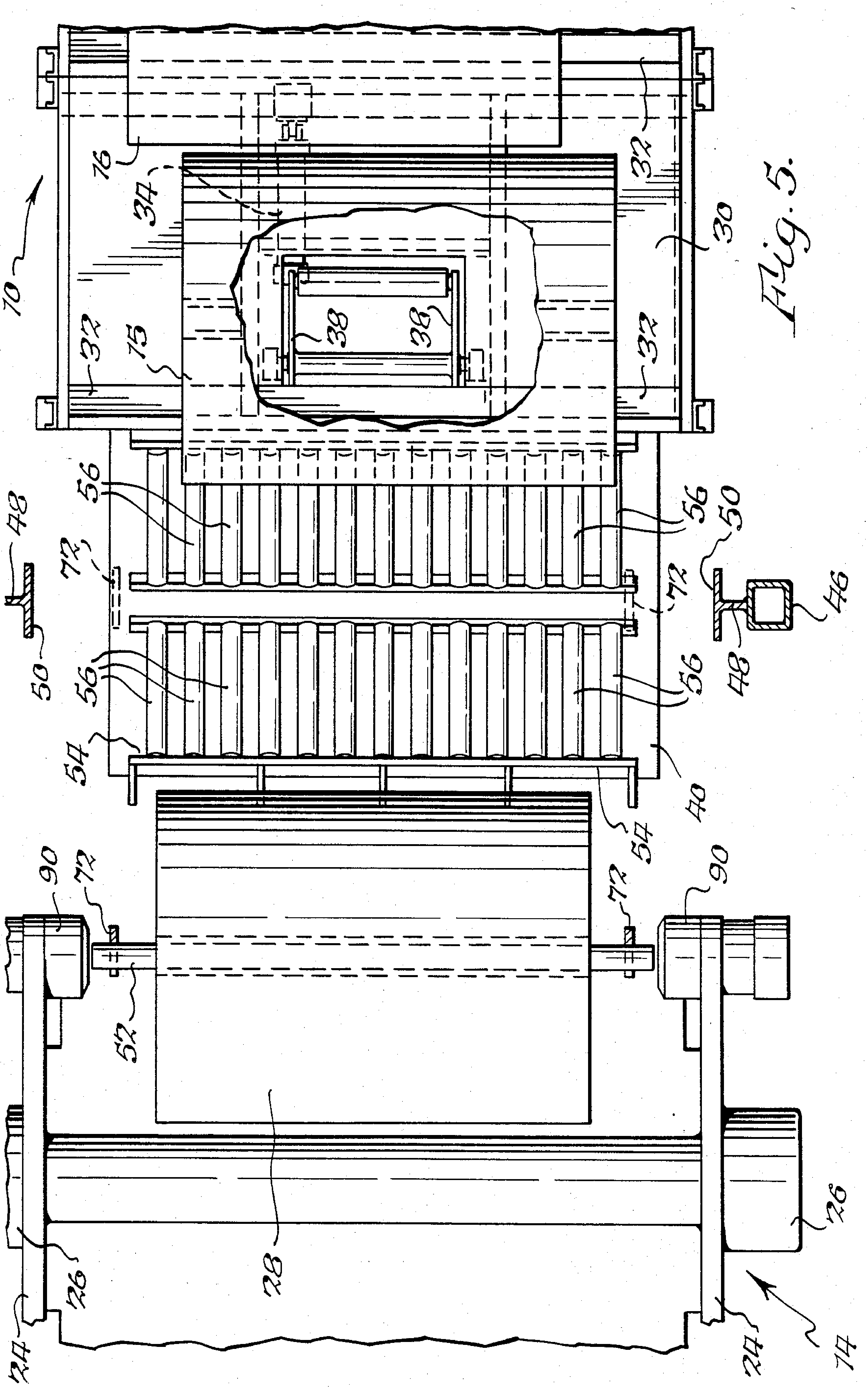

Fig. 5.

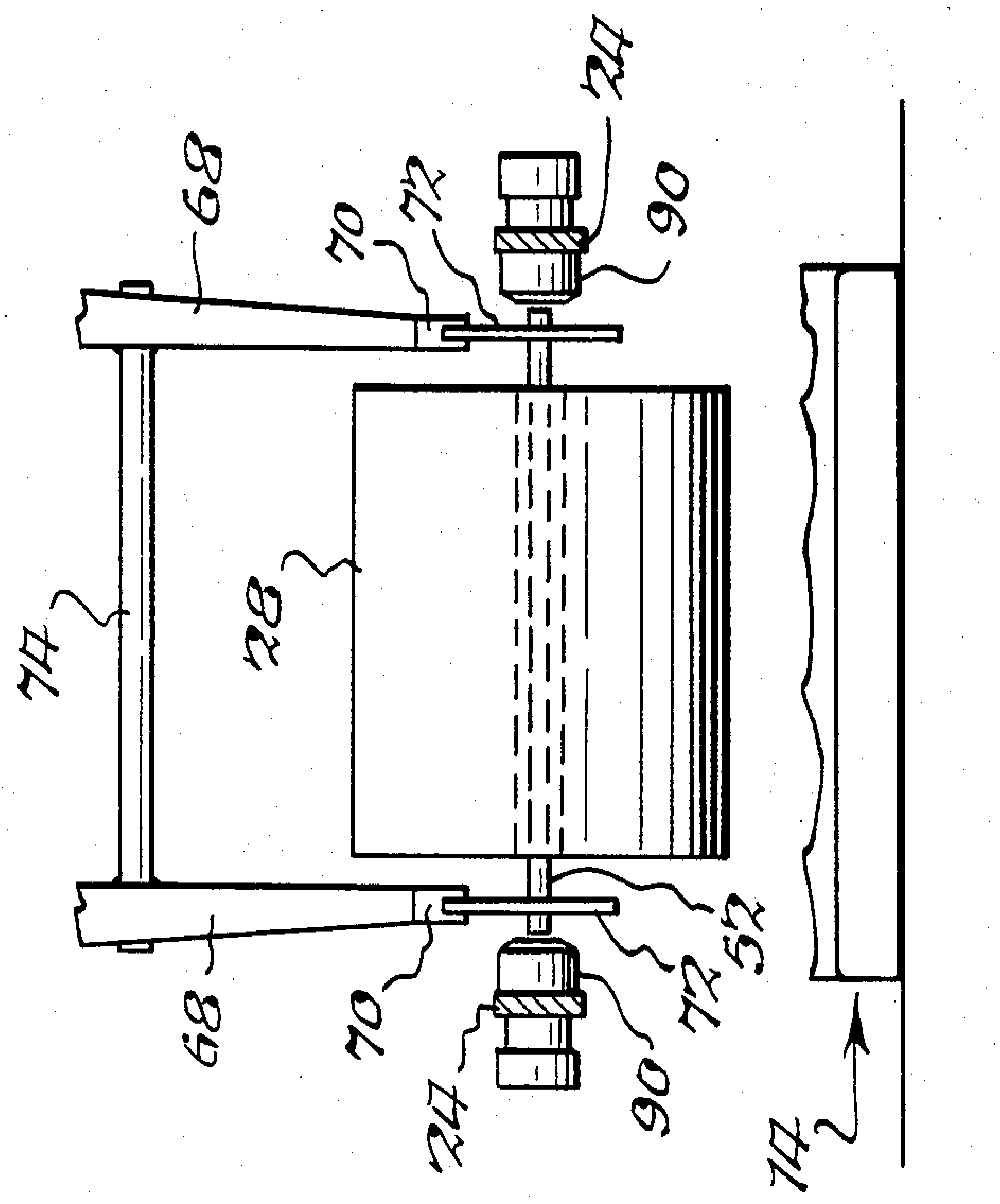
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Fig. 7.

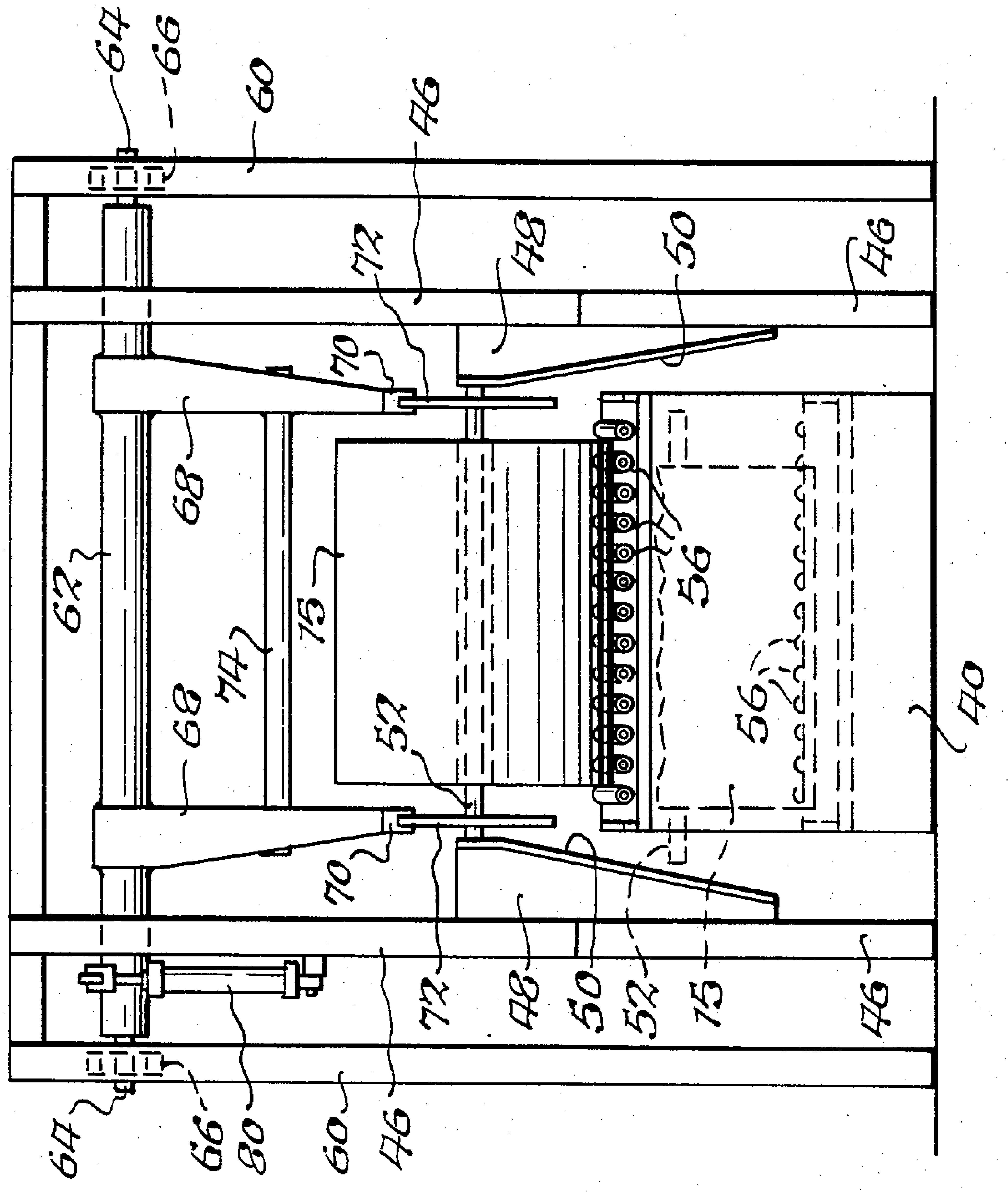
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Fig. 6.

PENDULUM ROLL LOADER

BRIEF SUMMARY OF THE INVENTION

The invention relates to apparatus for handling rolls of material, the apparatus including storage means for storing a plurality of rolls of material, an unwinder device including means for receiving a shaft of one of the rolls and supporting the shaft during unwinding of the material thereon, and a transfer means for sequentially indexing each of the plurality of rolls of material from the storage means to the unwinder device.

The invention further relates to apparatus for storing a roll of material and presenting the roll to a work station, the apparatus including a roll supporting platform for receiving and supporting the roll of material, means for temporarily retaining a roll of material on the roll supporting platform, and means for moving the roll of material from the supporting platform toward a work station.

Still further, the invention relates to apparatus for precisely positioning a roll of material without regard for the weight or diameter of the roll, the apparatus comprising lift means for raising the roll of material, and cam means for positioning the roll axially of itself during lifting of the roll by the lift means.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevation view of the invention and illustrates that rolls of material are placed upon a first support platform or table by a fork-lift truck, or otherwise, and each roll is then moved one at a time, from right to left, onto an elevator or lift table, subsequently raised into position to by grasped by pendulum hooks and delivered to an unwinder device, connected thereto by spaced chucks and then swung into a delivery or unwind position.

FIG. **2** is a fragmentary view, similar to FIG. **1**, illustrating a roll of material being moved onto the lift table.

FIG. **3** is a fragmentary view, similar to FIG. **2** and illustrates the lift table being in a raised position and the lift hooks being automatically positioned beneath the roll shaft.

FIG. **4** is a fragmentary view and illustrates a roll of material being placed in the unwinder device following retraction of the lift table.

FIG. **5** is a fragmentary plan view taken along line **5—5** in FIG. **1**.

FIG. **6** is a vertical sectional view taken along line **6—6** in FIG. **1** and illustrates a pair of spaced cams which, automatically centers the roll of material through interaction of the cams with the roll shaft.

FIG. **7** is a fragmentary sectional view taken along line **7—7** in FIG. **1** and illustrates the lift hooks holding the roll of material in an accurately aligned position ready to be grasped by spaced chucks of the unwinder device.

DETAILED DESCRIPTION OF THE INVENTION

As is best shown in FIG. **1**, the invention is comprised of essentially three main components including a storage section generally indicated by the numeral **10**, roll transfer apparatus generally indicated by the numeral **12**, and an unwinder device generally indicated by the numeral **14**. A series of rolls of material **15**, **16** and **17** are retained in storage section **10** ready for use in a manner which will be later described.

It will be seen at the left of FIG. **1** that a roll of material **18** is being depleted by having a web of material **19** being unwound therefrom. The web **19** may be fed to any of a number of different machines for any series of operations thereon which do not form part of the present invention. However, for illustrative purposes, one can imagine the web **19** as being fed to a coating machine, or a printing machine or a cutting machine, or any other type of similar devices.

The unwinder device **14** is a known piece of equipment and includes a base **20**, upstanding support pedestals **22** and support arms **24** rotatably mounted in a pillow box **26** and is usually driven by a motor (not shown) for rotating the support arms **24** of roll **18** in order to place the next roll of material **28** in the operative unwinding position.

Following the complete unwinding of the roll of material **18** and the subsequent rotation of support arms **24** to position roll of material **28** in the unwinding position, the invention contemplates the sequential feeding of the rolls of material **15**, **16** and **17** from the storage section **10** to the unwinder device **14** by the transfer apparatus **12**.

Storage section **10** is comprised of a series of identical support platforms **30** each of which is slightly inclined for causing the rolls of material to rest against a bumper or stop member **32**. Each supporting platform **30** is provided with a fluid motor, preferably in the form of a hydraulic cylinder **34** and a piston rod **36** which is pivotally connected to a push lever **38** which, in turn, is pivotally mounted beneath the supporting platform **30** such that, as is best shown in FIG. **2**, upon retraction of the piston rod **36** into the cylinder **34**, the push lever **38** rotates upwardly and displaces the roll of material **15** off of the supporting platform **30** and onto a lift table **40** for a purpose to be later described. At this point of the operation, it is to be understood that, following the positioning of roll **15** upon the lift table **40**, the rolls of material **16** and **17** are, sequentially, stepped forward to the left in FIG. **1** and an additional roll of material **42** is placed upon the first supporting platform **30** through the use of a fork-lift truck **44** or any other type of roll handling apparatus.

Referring particularly to FIGS. **1** and **6**, transfer apparatus **12** includes a pair of support posts **46** disposed alongside opposite ends of lift table **40**, each post **46** having fixedly secured along its vertical inside surface a support web **48** and an inwardly and upwardly tapered cam surface **50**. The cam surfaces **50** function by engaging the end, or ends, of a roll shaft **52**, which roll shaft **52** is fixedly secured quite precisely centrally in roll of material **15**. It is believed to be readily understandable that when the various rolls of material **15**, **16**, **17**, etc. are each placed in the storage section **10** by the fork-lift **44**, the respective rolls can be, and most likely are, offset laterally with respect to each other and are, therefore, not in the necessary precise transverse alignment for being properly received within the support arms **24** of the unwinder device **14**. Referring to FIGS. **2**, **3**, **5** and **6**, retraction of piston rod **36** into cylinder **34** causes rotation of lever **38** upwardly through a central opening in supporting platform **30** (see FIG. **5**) such that roll **15** is forced over the bumper or stop member **32** and roll **15** comes to rest upon lift table **40**. A bumper or stop member **54** is secured to lift table **40** to prevent roll **15** from moving too far. Lift table **40** includes a plurality of angularly disposed anti-friction rollers **56** which support the roll of material thereon and provide for freedom of movement of the roll **15** in a direction along its axis such that, as is best shown in FIG. **6**, upon raising of the lift table **40** the roll shaft **52** (shown in broken lines near the bottom of FIG. **6** and misaligned to the left of center) is, during raising of the lift table **40**, brought into engagement with the left-most cam surface **50** causing the roll of material **15** to be moved to the right on anti-friction rollers **56** such that the material is precisely positioned not only with regard to vertical height but also in the lateral or transverse direction. It is at this stage of the operation that the roll shaft **52** is for the first time located in a predetermined, precise position.

Transfer apparatus **12** includes a second pair of vertically disposed support posts **60** which are located on opposite sides of unwinder device **14**. A support tube **62** extends between the support posts **60** and is pivotally mounted thereon by spaced trunnions **64** which are rotatably mounted within pillow blocks **66**. A pair of spaced pendulum lift arms **68** are rigidly secured to the support tube **62** and each lift arm **68** is provided at its lowermost end with a clevis **70** and spaced lift hooks **72** pivotally mounted within each clevis **70**. A brace member **74**, as best shown in FIG. **6**, is securely fastened between the respective arms **68** to provide additional strength.

Referring particularly to FIGS. **2**, **3** and **4**, the lift hooks **72** are rotatable with support tube **62** by an extensible fluid motor **80** which is pivotally connected between a support brace **82** and a crank **84**, the crank **84** being fixedly secured to the support tube **62**. Preferably, the fluid motor **80** is a conventional hydraulic cylinder and piston rod such that, upon extension of the piston rod, the support arms **68** are moved on trunnions **64** to bring the lift hooks **72** into the position shown in FIG. **2** in spaced relation above the roll shaft **52** contained in the roll of material **15**. In operation, after the roll **15** is moved onto the lift table **40**, as is shown in FIG. **2**, the lift table **40** is moved upwardly as is shown in FIG. **3**. During this upward movement, the roll shaft **52** will strike a cam surface **88** on the underside of the hooks **72** for temporarily swinging the hooks **72** from the path of the roll shaft **52**, the hooks **72** then rotating on clevis **70** into the position shown in FIG. **3**. During this lifting motion, as will be best understood by referring to FIG. **6**, a misaligned roll **15** and roll shaft **52** will engage one or the other of cam surfaces **50** for causing the roll **15** to be moved upon anti-friction rollers **56** into precise alignment for being accurately received by the unwinder device **14**. As the piston rod is retracted into fluid motor **80**, as is shown in FIG. **4**, the roll of material **15** is carried from above the now collapsed lift table **40** and swung into precise alignment with the unwinder device **14** to be grasped by a pair of spaced chuck members **90** which are carried by the support arms **24** of the unwinder device **14**, as shown in FIGS. **5** and **7**.

From the foregoing description of the preferred embodiment, it is apparent that the invention contemplates the sequential positioning of rolls of material to an unwinder device in such a manner that the rolls are moved from a storage section by means of transfer apparatus which automatically align the roll shafts during the transfer operation. While a preferred embodiment of the invention has been shown and described in detail, the invention is not limited to such a preferred apparatus but is to be limited only by the spirit and scope of the invention as defined by the claimed subject matter.

We claim:

1. Apparatus for handling rolls of material, said apparatus including storage means for storing a plurality of rolls of material, an unwinder device including means for receiving a shaft of one of said rolls and supporting said shaft during unwinding of the material thereon, transfer means for sequentially indexing each of said plurality of rolls of material from said storage means to said unwinder device, said transfer means including lift means for raising one of said rolls of material, cam means for axially positioning said roll into alignment with said means for receiving a shaft during lifting of said roll by said lift means, said lift means including anti-friction means for supporting said roll of material and providing freedom of movement axially of said roll, a roll shaft carried by said roll of material and engageable with said cam means during lifting of said roll for moving said roll in a direction axially of said shaft on said anti-friction means, said transfer means including a frame, hook means pivotally mounted on said frame and engageable with said roll shaft for supporting said roll of material following precise positioning of said roll shaft by said cam means.

2. Apparatus as defined in claim **1** wherein said unwinder device includes spaced members for receiving said roll shaft and supporting a roll of material thereon, and means on said frame for moving said roll of material from said lift means and bringing said roll shaft into alignment with said spaced members of said unwinder device.

3. Apparatus for precisely positioning a roll of material without regard for the weight or diameter of said roll, a shaft secured in said roll axially thereof, said apparatus comprising lift means for raising said roll of material, cam means for engaging an end of said shaft and moving said roll axially during lifting of said roll by said lift means, said lift means including anti-friction means for supporting said roll of material and providing freedom of movement axially of said roll, a frame located adjacent to said lift means, transfer means carried by said frame, hook means pivotally mounted on said transfer means and engageable with said shaft for supporting said roll of material, said hook means including a cam surface engageable with said shaft during said movement of said roll for moving said hook from the path of movement of said shaft.

4. Apparatus for precisely positioning a roll of material without regard for the weight or diameter of said roll, a shaft secured in said roll axially thereof, said apparatus comprising lift means for raising said roll of material, cam means for engaging an end of said shaft and moving said roll axially during lifting of said roll by said lift means, said lift means including anti-friction rollers for engaging and supporting said roll of material and providing freedom of movement axially of said roll, a frame located adjacent to said lift means, transfer means carried by said frame, means carried by said transfer means for providing a connection with said shaft and means for moving said transfer means and said roll of material from a first position to a second position.

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